iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 10 **Issue:** VII **Month of publication:** July 2022

DOI: https://doi.org/10.22214/ijraset.2022.45773

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 10 Issue VII July 2022- Available at www.ijraset.com

Android Based Indian Currency Recognition System Using Transfer Learning Technique

Umesh. T. Golani[1], Dayanand Jamkhandikar[2], Jasbir Singh[3], Mohammed Iftekar Ahmed[4]
[1, 2, 3]*UG Student Department of CSE Guru Nanak Dev Engineering College, Bidar, Karnataka*
[4]*Professor Department of CSE Guru Nanak Dev Engineering College, Bidar, Karnataka*

Abstract:** This work is dedicated to develop a computer vision-based approach for Indian paper currency recognition. In this approach, extract currency feature and develop a dataset which can be used for the currency recognition. Security feature of Indian currency note available on front and back side Rs.10, Rs. 20, Rs. 50, Rs. 100, Rs. 200 Rs. 2000 and Rs. 500 denominations are used in model Training. Advances in technology have replaced people in almost every field with machines. Thanks to the introduction of machines, banking automation has reduced the burden on humans. Banking automation requires more attention to declining currency handling. When the banknote is blurred or defaced, it is difficult to identify its currency value. A sophisticated design is included to increase the security of the call. This makes the call recognition task very difficult. For correct currency recognition, it is very important to choose a good function and an appropriate algorithm. One of the main problems that blind people face is the recognition of money, especially cash. In a way, the seemingly weakened people do not think about cash settlement and run into problems related to cash transactions in their daily life. It is a useful treatment for those who are externally weakened. Studies and trials were conducted according to key points, such as watermarks, images printed on money, the value of words and numbers, and the total amount of information gathering that stimulated CNN using Transfer Learning. And the second thought after designing a proper algorithm for Indian Currency Recognition, the problem is to carry the mechanism, which can be a burden or sometimes forgotten. Therefore this design help in a lot way for easier way to recognising the Currency just by not making an extra equipment, but by designing an android app, where it is not needed to carry any extra thing, as it is included in android smart phone, which is used by almost 748 million people in India.

***Keywords:** INCEPTION_RESNET_V2, CNN, blind people, image recognition, validation, Android Application, TensorFlow Lite, Keras, Indian Currency*

I. INTRODUCTION

Currency is the medium of exchange. Money related transactions are an important part of our day to day lives. Along with technology the banking sector is also getting modern and being explored. In spite of the widespread usage of ATMs, Credit- Debit Cards, and other digital modes of payment like as Google Pay, Paytm, and Phone Pay, money is still widely used for most daily transactions due to its convenience.

Currency recognition or bank-note recognition is a process of identifying the denominational value of a currency. It is a simple and straightforward task for the normal human beings, but if we consider the visually challenged people currency recognition is a challenging task. Visually impaired people have a difficult time distinguishing between different cash denominations. Even though unique symbols are embossed on different currencies in India, the task is still too difficult and time-consuming for the blind.

This brings a deep need for automatic currency recognition systems. So, this work is about developing an android app in order to help the visually challenged or impaired people, Automation of Currency Recognition for many Sectors like Banking, Small-Scale Business, Petrol-Bunks and many more day-day transactions, so that they can differentiate between various types of Indian currencies through implementation of image processing techniques. The study aims to investigate different techniques for recognizing Indian rupee banknotes.

The proposed work extracts different and distinctive properties of Indian currency notes, few of them are the central number, RBI logo, colour band, and special symbols or marks for visually impaired, and applies algorithms designed for the detection of each and every specific feature. From our work the visually impaired people will be capable of recognizing different types of Indian Currencies while their monetary transactions, so that they lead their life independently both socially and financially by using Transfer Learning which will ultimately contribute towards a more civil society.

A. Existing System

From the observation of the papers we can say that there are certain stages which are very important in the existing system architecture. Firstly we have the step called image acquisition means we have to take input as the image only through the scanner and in this there is no use of any digital camera to capture the image in the real time system. In this existing architecture, only the front part of the note is taking into consideration and not the rear part. After that we have next step called as pre-processing method. In this there are basically 3 to 4 sub stages involved like pre-processing, greyscale conversion, edge detection and segmentation.

B. Proposed System

The main objective of this work is to get familiar with the new security feature which is provided by the government of India so that they can differentiate between the different currency notes. Detecting of Currency note some module including image acquisition, Image per processing, Image adjusting, Greyscale conversion, Edge detection, Segmentation, Feature extraction, classification every step required algorithm for which using OpenCV library (open source computer vision library) which is automated using Transfer Learning using Keras pre-trained model INCEPTION_RESNET_V2. Acquisition of image is process of capture a digital image from camera such that all features are detected and learned by the model. In the project we proposed a novel and self-learning approach for the detection and classification of different Indian currency notes and also there's a differentiator for old and new notes. This approach provides a simple technique to integrate different notes even if it is not Indian Currency just by re-running the training model.

C. Advantages

1) In this project we integrate our model in Android, so as to make it more easy, comfortable and lightweight to use.
2) Extensions exist for object-relational mappers, form validation, and upload handling, various open recognizing technologies and several common framework related tools.
3) Extensions are updated far more frequently than the core program.
4) The proposed system has got advantages like simplicity and high-performance speed. The result will predict which currency note it is.
5) Technology is growing very fast these days. Consequently, the banking sector is also getting modern day by day which requires a handy and fast solution for recognizing currency and other solutions to Banking activities to be automated, this project can help in complete automation and in handy solution for currency recognition

.

II. LITERATURE SURVEY

RESEARCH NO.	YEAR PUBLISHED	TYPE OF CURRENCY USED	ALGORITHM	DATASET USED	ACCURACY	LIMITATION
[1]	2009	Paper Currency	Hidden Markov Model	150 banknotes from 23 countries, with 101 different denominations	98%	The suggested system's accuracy is lower.
[2]	2010	Paper Currency	Block-LBP algorithm based on traditional LBP	545 RMB sheets (87 1yuan, 135 5yuan, 84 10 yuan, 66 20 yuan, 36 50 yuan, 137 100 yuan).	100%	their approach does well when dealing with pepper noise but not so well when dealing with Gaussian noise.

[3]	2017	Paper Currency	Automated Image Processing	20 of the most widely used currencies.	93.3%	Fake or counterfeiting cannot be detected even on re-training the model for differences in currency features
[4]	2017	Coin and Paper Currency	An Automatic currency recognition system through mobile using SIFT algorithm	10 different types of Jordanian-banknotes (50 JD, 20 JD, 10 JD, 5 JD, 1 JD, 50 piaster, 25 piaster, 10 piaster, 5 piaster, 1 piaster).	71%	their system has some drawbacks when they have some cases as (too wrinkled, folded several times, image taken from a near distance, image taken from a distance that is too great) for paper banknotes and some cases as (Images with high illumination, image taken from a near distance, image taken from a distance that is too great) for coin banknotes.
[5]	2018	Paper Currency	Otsu's thresholding tool, Image Processing techniques .	7 major amounts of Pakistani paper money (PKR-10, PKR-20, PKR-50, PKR-100, PKR-500, PKR-1000, PKR-5000)	51%	It may lose the accuracy if the picture is heavily rotated and the backdrop is crowded.

III.METHODOLOGY

1) Collecting Dataset of at -least 50 GB of different currency notes Rs. 10 old note, Rs. 10 new note, Rs. 20 old note, Rs. 20 new note, Rs. 50 old note, Rs. 50 new note, Rs. 100 old note, Rs. 100 new note, Rs. 200 note, Rs. 500 note, Rs. 2000 note.
2) Generating more Dataset in different orientation and angles for proper training of model using Image_DataGenerator form Tensorflow.keras.preprocessing.image
3) Pre-Processing the model, Resizing the images, Image Shearing, and Perspective Transformations
4) Training and Compiling the model and generating its summary for understanding trainable and non-trainable parameters.
5) Training and Testing the model for the Dataset, and Checking it for its accuracy
6) Validating the model, and Saving the model in Keras format with extensiton .h5
7) Getting the best models and converting the model to TensorFlow Lite model with extension .tflite.
8) Creating an Android app with Camera module and Manifest files for user permissions.
9) Integrating the .tflite model in the Android App and Testing for its accuracy.

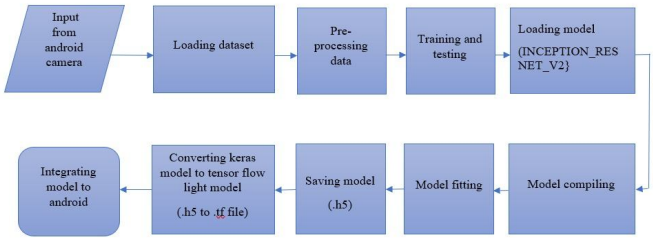


Fig 1. Methodology of the System Proposed

IV. OUTPUT AND RESULTS

A. *Results*

1) The system is unique in its applications.
2) The system allows the user to identify the currency note using there android device.
3) Images are taken from different orientations and varied distances can also be measured with great accuracy.
4) This paper gives an idea of developing currency recognition system for mobile devices using image processing technique.
5) This paper presents how to device an application for better performance and accuracy using pre-trained model.
6) According to model graph of validation of accuracy vs epochs (No. of times the model is being trained on the data collected gives a concise idea of how the accuracy increased on training more number of times.
7) According to model graph of validation of accuracy vs epochs (No. of times the model is being trained) on the data collected gives a concise idea of how the Loss decreases on training more number of times.
8) This paper suggests to produce voice outputs for the currency recognized by android mobile phone camera.

B. *Output*

Fig 2. Snapshot of output of 100 rupees note taken from Android Emulator in Android Studio

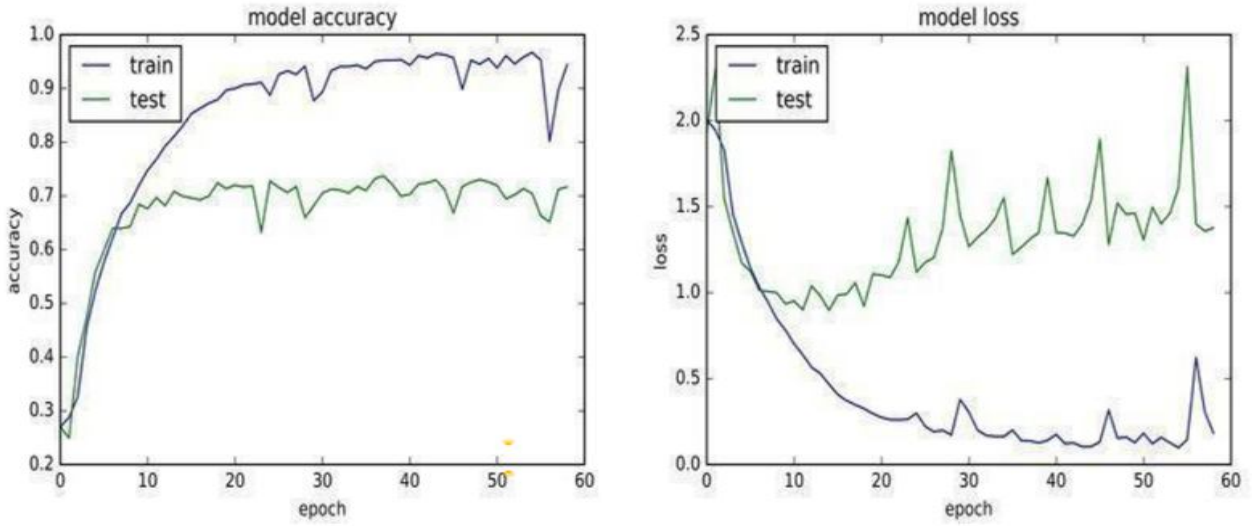


Fig. 3. Validation Graph Model accuracy and Loss vs Number of times it is being trained (Epochs)

V. CONCLUSIONS

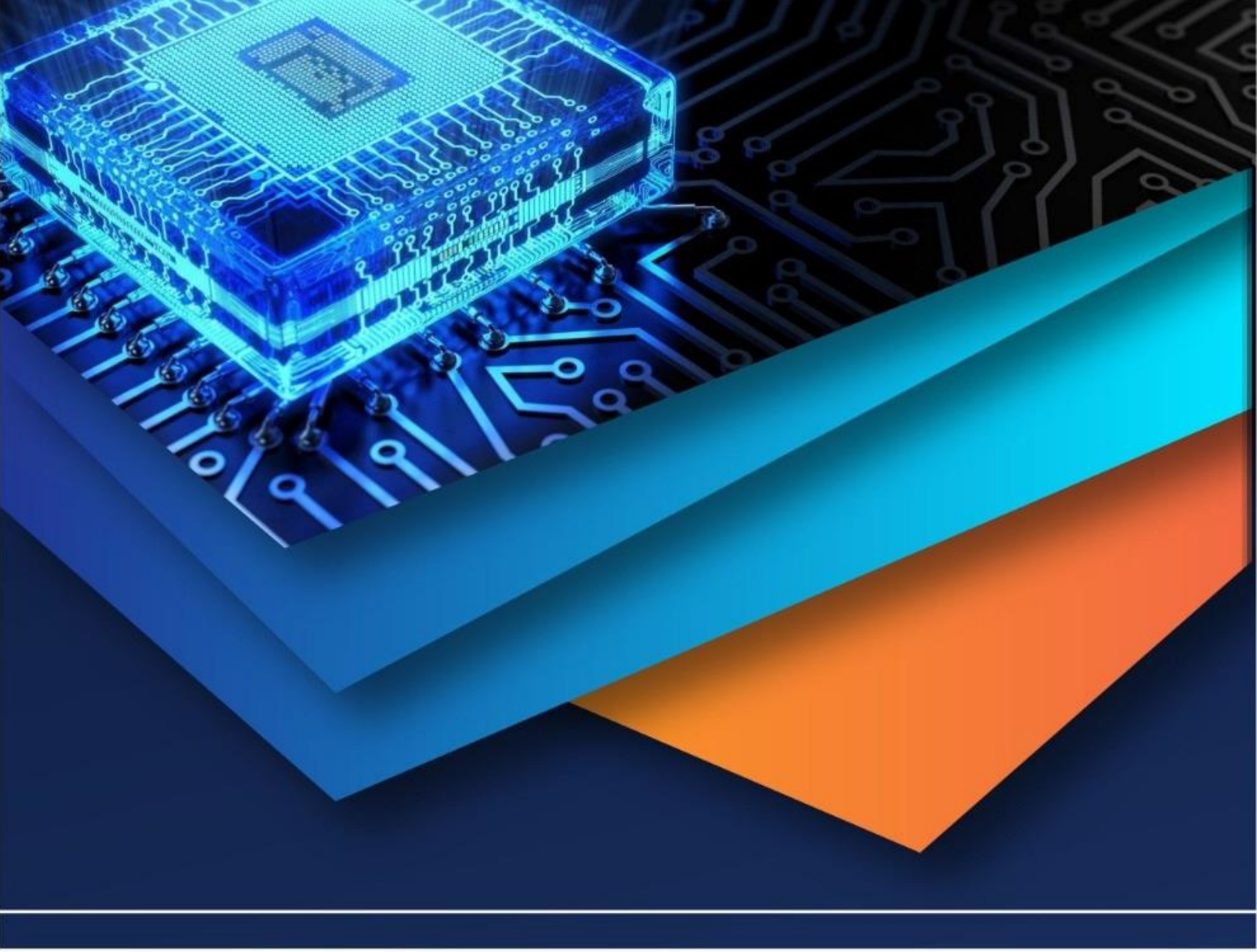
The currency notes are captured using android camera continued with pre-processing technique and then features are extracted from it by using Transfer Learning technique based on Keras pre-trained model INCEPTION_RESNET_V2. The features extracted by self-learning model help in efficiently matching the captured currency Note as a respective rupee from rupee 10, 20, 50, 100, 200, 500 and 2000. The INCEPTION_RESNET_V2 Transfer Learning technique is used in image processing (IMAGE-CLASSIFICATION) . When this technique is implemented in android platform then it becomes a very useful application. The Android app that will turn a regular smart phone into a powerful tool for the people that are Visually Impaired, small-scale Business, low-crowded petrol-bunks, and small banks. We achieved the Good Accuracy results with the model selected for training, with a very large Dataset of nearly 100 GB. By providing the best possible Interface to the users.

VI. ACKNOWLEDGMENT

The heading of the Acknowledgment section and the References section must not be numbered.
Causal Productions wishes to acknowledge Michael Shell and other contributors for developing and maintaining the IEEE LaTeX style files which have been used in the preparation of this template. To see the list of contributors, please refer to the top of file IEEETran.cls in the IEEE LaTeX distribution.

REFERENCES

[1] H. Hassanpour and P. M. Farahabadi, “Using Hidden Markov Models for paper currency recognition,” Expert Syst. Appl., vol. 36, no. 6, pp. 10105–10111, 2009, doi: 10.1016/j.eswa.2009.01.057.
[2] J. Guo, Y. Zhao, and A. Cai, “A reliable method for paper currency recognition based on LBP,” in Proceedings - 2010 2nd IEEE International Conference on Network Infrastructure and Digital Content, IC-NIDC 2010, 2010, pp. 359–363, doi: 10.1109/ICNIDC.2010.5657978.
[3] A. Roy, B. Halder, U. Garain, and D. S. Doermann, “Machine-assisted authentication of paper currency: an experiment on Indian banknotes,” Int. J. Doc. Anal. Recognit., vol. 18, no. 3, pp. 271–285, 2015, doi: 10.1007/s10032-015-0246-y.
[4] I. Abu Doush and S. AL-Btoush, “Currency recognition using a smartphone: Comparison between color SIFT and gray scale SIFT algorithms,” J. King Saud Univ. - Comput. Inf. Sci., vol. 29, no. 4, pp. 484–492, 2017, doi: 10.1016/j.jksuci.2016.06.003.
[5] M. A. Ansari and S. K. Mahraj, “A Robust Method for Identification of Paper Currency Using Otsu’s Thresholding,” in 2018 International Conference on Smart Computing and 61 Technium Vol. 3, Issue 7 pp.46-63 (2021) ISSN: 2668-778X www.techniumscience.com Electronic Enterprise, ICSCEE 2018, 2018, pp. 1–5, doi: 10.1109/ICSCEE.2018.8538424.
[6] https://keras.io/api/applications/inceptionresnetv2/
[7] https://arxiv.org/abs/1602.07261
[8] https://keras.io/api/applications/



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY